

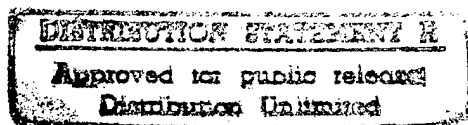
DOCUMENTED BRIEFING

RAND

GED Accessions in the Selected Reserve

How Long Do They Serve?

Richard Buddin, Sheila Nataraj Kirby



DTIC QUALITY INSPECTED 2

National Defense Research Institute

DB-218-05D

19971124 068

The research described in this report was supported by the Office of the Secretary of Defense (OSD). The research was conducted in RAND's National Defense Research Institute, a federally funded research and development center supported by the OSD, the Joint Staff, and the defense agencies under Contract No. DASW01-95-C-0059.

ISBN: 0-8330-2531-7

The RAND documented briefing series is a mechanism for timely, easy-to-read reporting of research that has been briefed to the client and possibly to other audiences. Although documented briefings have been formally reviewed, they are not expected to be comprehensive or definitive. In many cases, they represent interim work.

RAND is a nonprofit institution that helps improve public policy through research and analysis. RAND's publications do not necessarily reflect the opinions or policies of its research sponsors.

© Copyright 1997 RAND

All rights reserved. No part of this book may be reproduced in any form by any electronic or mechanical means (including photocopying, recording, or information storage and retrieval) without permission in writing from RAND.

Published 1997 by RAND

1700 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138

1333 H St., N.W., Washington, D.C. 20005-4707

RAND URL: <http://www.rand.org/>

To order RAND documents or to obtain additional information, contact Distribution Services: Telephone: (310) 451-7002; Fax: (310) 451-6915; Internet: order@rand.org

DOCUMENTED BRIEFING

RAND

GED Accessions in the Selected Reserve

How Long Do They Serve?

Richard Buddin, Sheila Nataraj Kirby

*Prepared for the
Office of the Secretary of Defense*

National Defense Research Institute

PREFACE

A third of all high school dropouts earn a General Educational Development (GED) credential by passing an examination in math, science, and other academic skills. This report profiles those GED-holders who enter the Selected Reserve components and examines the issue of how long they serve. Concerns have been voiced lately about the increase in the proportion of GEDs being recruited by the reserves and what this means in terms of return on recruiting and training investment. In particular, the question of how comparable GEDs are to high school diploma graduates in terms of behavior is a critical one with important implications for recruiting policy. This report addresses this issue using data on FY86-FY94 entry cohorts; it examines both prior-service and nonprior-service gains into the Reserve components.

The work was sponsored by the Assistant Secretary for Reserve Affairs. This research was conducted in the Forces and Resources Policy Center, which is part of RAND's National Defense Research Institute, a federally funded research and development center sponsored by the Office of the Secretary of Defense, the Joint Staff, and the defense agencies.

ACKNOWLEDGMENTS

We wish to thank Joel Resnick and Wayne Spruell for their support of this study and Dan Kohner for supplying us with some of the data on GED accessions in the Reserve components. The report benefited greatly from the helpful comments provided by our RAND colleague, Dominic Brewer, who reviewed a draft of the final report, and Susan Hosek, Program Director of the Forces and Resources Policy Center.

SUMMARY

This report is structured around three major issues:

- How common are GED accessions in the Selected Reserve components and are there differences in the numbers/proportions of GEDs recruited by the various components? Has the proportion of accessions who are GEDs changed over time?
- How does the attrition behavior of GEDs compare with that of high school diploma graduates (HSDGs)?¹ HSDG recruits are generally more expensive to recruit; if there is little difference in attrition behavior, then one might need to reexamine the cost-effectiveness of recruitment strategies that place heavy emphasis on recruiting those with a high school diploma. However, if many GEDs leave before the end of the completed term of service, then higher training and replacement costs may well outweigh the initial lower recruiting costs.
- Are there differences among GEDs? For example, do recent cohorts of GEDs display higher or lower attrition than earlier cohorts? Is it better to recruit older or younger GEDs? Do GEDs who score higher on the Armed Forces Qualifying Test (AFQT) do better than those scoring lower?² An important corollary to this question is whether high-scoring GEDs serve longer than HSDG who score below the 50th percentile on the AFQT. This is one question that the components have been struggling with in trying to set recruitment standards.

DATA AND METHODS OF ANALYSIS

We use data from the FY86-FY94 entry cohorts to examine these questions. Prior-service (PS) and nonprior-service (NPS) entrants are analyzed separately for several reasons discussed in the main body of the report. The most important reason was our hypothesis that the screening value of education was likely to be quite different for the two groups.

We adopt the component's definition of attrition: A recruit is counted as a loss when he leaves the Reserve component that he initially joined regardless of whether he later rejoins the component or transfers to another component.

We use duration analysis techniques (both the Kaplan-Meier estimators and the Cox proportional hazards model) to study when attrition occurs.

¹ We use the term HSDG to distinguish between those who received the high school diploma and GEDs who received an alternative credential. Both groups are high school graduates.

² Enlistees are classified into various categories based on their percentile rankings on the AFQT: Category I (93-99); Category II (65-92); Category IIIA (50-64); Category IIIB (31-49); and Category IV (10-30).

FINDINGS

How Common Are GED Accessions?

- Approximately 6 percent of all accessions are GEDs;
- This proportion is considerably higher in the ARNG; and,
- The Guard has been taking in higher proportions of GEDs in recent years.

How Does GED Attrition Compare With That of HSDGs?

- Among NPS recruits, the lack of a formal diploma appears to have a marked negative effect on attrition, with GEDs having attrition rates that are close to double that of HSDGs (30 percent compared with 16 percent);
- Among PS recruits, the differences are considerably smaller (8 percentage points);
- In percentage terms, the differences are even more marked: Compared to the attrition rate of the HSDG group, the first-year attrition rate of the GED group is 80 percent higher among NPS accessions and only 20 percent higher among PS accessions;
- These patterns hold true over time and across components.

Are Some GEDs “Better” Than Others? _

- Attrition rates for recent NPS cohorts have risen (particularly among the HSDG recruits) whereas those for PS entry cohorts have declined (although not as much for the HSDG recruits). The attrition gap between GEDs and HSDGs has narrowed a little, but for NPS recruits, the difference is still quite marked.
- Attrition rates are quite similar for younger and older GEDs although among HSDGs, age does have an effect on attrition, with older recruits leaving at higher rates than younger recruits.
- Aptitude category does not appear to compensate for the lack of formal schooling. Higher aptitude GEDs do not have markedly lower attrition than lower aptitude GEDs and regardless of AFQT category, they have significantly higher attrition than HSDGs (somewhat higher among PS recruits).

All in all, GEDs appear to be “high-risk” accessions, and this holds true regardless of age or aptitude. Recruiting them does not appear to be cost-effective. Even if they are considerably cheaper to recruit than HSDGs, the high rates at which they leave means a considerable loss of training investment and potential loss of readiness due to turbulence and this makes them an expensive source of accessions.

NDRI

GED ACCESSIONS IN THE RESERVE COMPONENTS: HOW LONG DO THEY SERVE?

Richard Buddin
Sheila Nataraj Kirby

RAND

This report examines the success of GED¹ recruits in the Selected Reserve components and is an offshoot of a much larger study of attrition in Reserve components (Buddin and Kirby, 1996). There has been some concern lately about whether the Reserve components (particularly the Army National Guard) have increased the number of GED accessions and what this means in terms of the return on recruiting and training investment. The discussion below elaborates on this point.

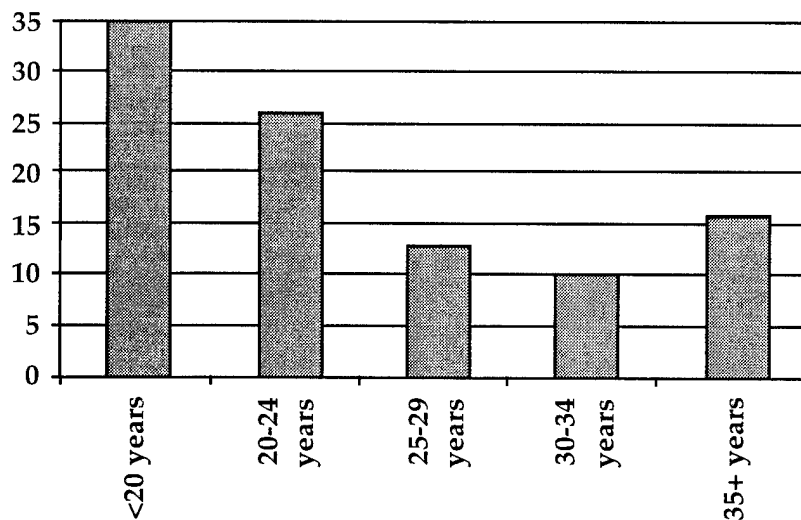
New recruits into the Selected Reserve components generally enlist for six years, with an overall eight-year military obligation. Each enlistee requires a significant recruiting and training investment to become fully qualified in a military occupational specialty. In addition to pay, the training investment includes training resources during the first 8-11 weeks of basic training followed by a period of Advanced Individual Training, and finally on-the-job training at the unit level. The return on this training investment normally occurs as the individual serves his term of service and the remaining period of military obligation with the Individual Ready Reserve. This return can be substantially reduced if individuals leave before their committed term of service.

¹ General Educational Development certificate: This is an alternative school-leaving credential that can be obtained by passing the GED examination. This tests skills in writing, social studies, science, reading, and mathematics.

If GEDs are easier and cheaper to recruit but tend to leave before completing their term of service, then the Reserve components may be faced with a difficult tradeoff: lower initial recruiting costs against higher training and replacement costs. There is little hard evidence on how long GEDs serve once they enlist and how well they perform. The analysis here is an attempt to answer the first question. We cannot, with our data, address the second question.

It might be helpful to provide some background information on GED certificate-holders. The number of people receiving high school equivalency credentials based on the GED tests has more than doubled since the early 1970s, and in 1994, 498,000 GED credentials were issued out of a total of 788,000 test-takers. Recently, GEDs have accounted for about 14-15 percent of total new recipients of high school credentials.

There are marked differences in the use of GED certification by race/ethnicity, with blacks and Hispanics having much higher proportions of GED certificate-holders than whites (11 percent compared with 7 percent) (Cameron and Heckman, 1993). The percentage distribution of the test-takers in 1994 by age (see the figure below) shows that about three-fifths of GED test-takers take it within a few years after dropping out of high school. On average, GEDs tend to have more years of completed high school education than those without a high school education.



BACKGROUND

NDRI

- GED recruits have very high active-duty attrition
 - first-term loss rates are twice those of recruits with formal high school diploma
 - attrition pattern is similar to that of high school dropouts
- Previous Reserve component analysis showed very high loss rates for GED accessions
- Civilian literature shows GED certificate-holders have no better labor market prospects than high school dropouts

RAND

Previous research on active-duty enlistees (Buddin, 1984) has shown that GEDs have an early attrition rate (defined as loss within six months of accession) that is markedly higher than that of recruits who are high school diploma graduates (HSDGs). For example, about 9 percent of HSDG Army recruits left within six months of joining, compared with over 16 percent of GED recruits. Similar differences were found in each of the other services. GED recruits had attrition rates close to that of enlistees with less than a high school education. These numbers are somewhat dated: The analysis was done on 1979 accessions who were followed through the end of FY82.

The same pattern is true of reservists (Kirby and Grissmer, 1993). Analyses of FY82-FY88 nonprior-service entry cohorts revealed that about 45 percent of both GEDs and those with less than high school education had separated within the first two years of joining, compared with 25 percent of high school diploma graduates. Differences of this magnitude were found in every Reserve component.

In the civilian labor force, many analyses have found that there is no cheap substitute for schooling. Passmore (1988) found that, in terms of earnings, GED-holders fall somewhere between HSDG and other high school dropouts.

Cameron and Heckman (1993) strongly reject the notion that GEDs are the labor market equivalents of high school graduates and, in fact, find that “both dropouts and exam-certified equivalents have comparably poor wages, earnings, hours of work, unemployment experiences, and job tenure.” In a recent article, Murnane et al. (1995) investigated whether high school dropouts benefit from obtaining a GED. They find positive effects on both labor supply and earnings and hypothesize that this may be largely because of the impetus the GED provides for entry into skill-enhancing programs or searching for a better job. However, they point out that predicted earnings are quite low, even after the acquisition of a GED credential.

RESEARCH QUESTIONS

NDRI

- **How common are GED accessions in the Reserve components?**
- **How does GED attrition compare with that of HSDGs?**
- **Are some GEDs "better" than others?**
 - Trends in recent years
 - Older versus younger recruits
 - Higher aptitude versus lower aptitude

RAND

The briefing is structured around three major issues:

- How common are GED accessions and are there differences in the numbers/ proportions of GEDs recruited by the various components? Has the proportion of accessions who are GEDs changed over time?
- How does the attrition behavior of GEDs compare with that of HSDGs?² HSDG recruits are generally more expensive to recruit; if there is little difference in attrition behavior, then one might need to reexamine the cost-effectiveness of recruitment strategies that place heavy emphasis on recruiting those with a high school diploma. As we mentioned above, if many GEDs leave before the end of their completed term of service, then higher training and replacement costs may well outweigh the initial lower recruiting costs.
- Are there differences among GEDs? For example, do recent cohorts of GEDs display higher or lower attrition than earlier cohorts? Is it better to recruit older or younger GEDs? Do GEDs who score higher on the Armed Forces Qualifying Test (AFQT) do better than those scoring lower?³ An important corollary to this question is whether high scoring GEDs serve longer than HSDGs who score below the 50th percentile on the AFQT. This is one question that the components have been struggling with in trying to set recruitment standards.

² We use the term HSDG to distinguish between those who received the high school diploma and GEDs who received an alternative credential. Both groups are high school graduates.

³ Enlistees are classified into various categories based on their percentile rankings on the AFQT: Category I (93-99); Category II (65-92); Category IIIA (50-64); Category IIIB (31-49); and Category IV (10-30).

DATA

NDRI

- FY86-FY94 entry cohorts, tracked forward to September 1994
- 20 percent random sample selected for the analysis
- NPS and PS accessions
- First reserve tour

RAND

The analysis is based on a longitudinal dataset that contains information on enlistees who joined the Selected Reserve components from FY86-FY94. Each individual was tracked forward through the end of FY94. We limited the analysis to those who were serving a first reserve tour: NPS without any prior military experience and PS who were joining the reserves after having completed at least two years on active duty. This latter follows the Congressional definition of prior service explicated in Title XI-the Army National Guard Combat Readiness Reform Act (U.S. House of Representatives, 1992).⁴

A 20 percent random sample was selected for the analysis: All those with social security numbers ending in 2 or 4 were selected (the initial start was determined randomly). The total analysis sample consisted of 252,692 observations, of which 107,972 were PS accessions, and 144,720 were NPS accessions.

⁴ The Congressional goals defined prior service as 24 months of active duty, presumably set to correspond to the shortest active-duty term available to enlistees. Reservists are given credit for active duty when attending annual training, initial active-duty training, or certain military schools for training. We estimate the months of active duty (TAFMS) by adjusting for the two weeks of annual training for those components that appeared to increment this measure for the annual training days (see Buddin and Kirby, 1996).

We exclude from the analysis prior reserve service accessions, i.e., individuals who were previously in the Reserve component and rejoined the reserves after a break in service (Kirby and Grissmer, 1993; Buddin and Kirby, 1996). This group tends to be rather heterogeneous, and it is difficult to generalize about them because they may have come in and out of the Reserve components (frequently transferring from one to the other) several times before the first time we see them in our data. We are interested in the behavior of GEDs entering the reserve for their *first* reserve tour, thus we exclude prior reserve service gains.

RESEARCH APPROACH I

NDRI

- **Definition of attrition:**
 - Separation from the component
 - First continuous time in service
- **Data are “right-censored” so duration analysis techniques that correct for censoring are appropriate**
 - Kaplan-Meier (life-table) estimators
 - Cox multivariate regression models

RAND

We adopt the component’s perspective when defining attrition. Attrition is defined as leaving the component regardless of whether the reservist later rejoined the same component or another component. Thus, we track continuous time in service from entry to first separation or the end of FY94. For most of the analysis, we show simple attrition statistics: For the FY86-FY93 cohorts, we determine what proportion of the cohort is still serving at the end of the first year (we observed all these reservists for at least one year).⁵ For the two-year statistics, we show data on selected cohorts, all of whom have been observed for the two-year period.

⁵ Our data consist of quarterly observations. Entry cohorts are grouped into fiscal year cohorts but within each cohort, the quarter of entry is initialized to one for every individual. Thus, a recruit who entered during the first quarter of a given fiscal year is tracked for four quarters to see whether he is still in the reserve after a year. An enlistee who entered in the third quarter would also be followed for four quarters (i.e., to the end of the second quarter of the subsequent fiscal year). When we talk about one-year attrition, every person in the group has been tracked for four quarters (including the quarter of entry).

However, for the longer time period, we use duration analysis techniques that correct for the fact that the data are right-censored for some individuals: That is, at the end of our observation point, some individuals are still serving their first term. We know only the amount of time that has elapsed from the time the individual entered the reserve and the end of FY94 and that the individual had not left by then. Special techniques have been developed to handle these censored data. (There is no left-censoring because we are dealing with entry cohorts, all of whom are joining the reserve for the first time.)

The basic function is a plot that indicates how likely it is that the reservist will continue in the Reserve component beyond the first year, the second year, and so on. At the beginning, 100 percent of the individuals are present in a Reserve component. As time passes, they gradually leave or separate from the component. Our estimate of the cumulative attrition rate, or the proportion that will leave the component within t years, is $1 - F(t)$.

We use two duration analysis techniques to study when attrition occurs. The first, the Kaplan-Meier estimator, is a descriptive technique that allows us to examine the distribution of attrition times for groups of interest. This allows us to see how variations in one characteristic affect the timing of attrition. This reveals the gross effect of that characteristic and everything else that varies with it. However, such univariate statistics may lead to misleading conclusions regarding the net effect of a particular variable on attrition because they show the effect of not just that variable but all other factors that may be associated with that variable.

A Cox (Cox, 1972) model was estimated to separate the effects of interrelated individual characteristics. This multivariate method divides the underlying risk of attrition into two parts: The first is a baseline risk and the second is a function of individual characteristics. Let the instantaneous attrition function equal

$$h(t) = h_0(t) \exp(b_0 + b_1 X_1 + \dots + b_k X_k),$$

where $h_0(t)$ is a common baseline risk function that applies to all enlistees; b_0, b_1, \dots, b_k are a set of shift parameters that move $h(t)$ upward or downward in all periods; and t is the number of quarters of Reserve component service. The model is proportional in the sense that the effect of a particular variable such as gender is assumed to shift the attrition risk in a proportional manner across all time periods. For example, if men were 5 percent less likely to separate from the reserves than women, the assumption that risk is proportional would restrict the predicted effect to be 5 percent higher in the first quarter of service and for each successive quarter as well. The advantage of this formulation over the Kaplan-Meier approach is the ability to hold constant a large number of factors. A potential weakness of the formulation is the possibility that the relative effects of some variables might change over time. Our Kaplan-Meier analysis provided evidence that the data are not at odds with the proportionality assumption.

RESEARCH APPROACH II

NDRI

- NPS and PS recruits examined separately
 - Factors affecting attrition are likely to be different for the two groups
 - Screening value of education as a quality measure may be different
- Differences in attrition between GEDs and HSDGs
 - Across components (special emphasis on ARNG)
 - Entry cohorts
 - Age (for NPS recruits only)
 - Aptitude category

RAND

We examine NPS and PS recruits separately, since it is likely that factors affecting attrition differ between the two groups—the PS group is older, with more experience, and experience specifically in the military. PS recruits self-select themselves into the reserve for a variety of reasons, not the least being that they enjoy military life and the chance to use their skills. Moreover, their families are familiar with the demands of military service and are supportive. In addition, for some of them—those entering with 10 or more years of service—retirement benefits may be a big incentive to stay. The NPS group is younger, inexperienced, and may have difficulty in adjusting to military life. They may also have greater difficulty in balancing family and reserve demands as well as managing a civilian job, particularly if this is their first experience with working.

It is also likely that the screening value of education may be quite different for the two groups. Obtaining a GED certificate rather than a high school diploma may provide different information regarding the motivation and ability of a young untrained recruit. First, there is some evidence to show that GEDs have a higher rate of attrition in the active force. As a result, a PS reservist with a GED who makes it to the end of his/her enlisted term of service and is eligible to enlist in the reserve has already demonstrated an interest and proficiency at a military job through active-duty service. Thus, we expect that educational background will provide a weaker determinant of reserve attrition for the PS group than for the untested NPS group.

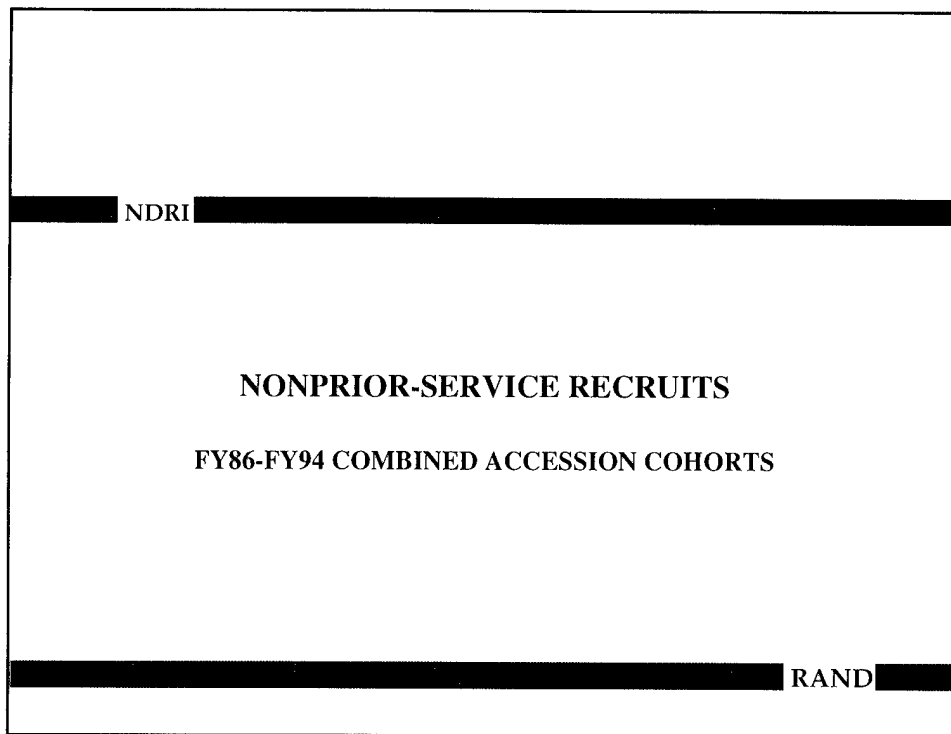
The findings presented in the following two sections (NPS and PS) are organized as follows:

- (a) Proportion of GEDs and those with less than high school in the Reserve components in the combined FY86-FY94 entry cohorts;
- (b) Changes in this proportion over time for the ARNG;
- (c) Comparisons of GED and HSDG attrition across the six components for one-year and two-year attrition;

The remainder of the analysis uses the full sample combined across all components and generally across all entry cohorts.

- (d) Comparison of longer-term attrition for the combined cohorts; we also provide information on four educational attainment groups (<HS, GEDs, HSDG, college degree); this helps answer questions of whether GEDs look similar to those with less than high school and whether HSDGs are similar to those with college degrees;
- (e) Comparison of GED and HSDG attrition among the more recent entry cohorts ;
- (f) Comparison of GED and HSDG attrition across different age groups (also presented separately for ARNG);
- (g) Distribution of aptitude by educational attainment groups;
- (h) Comparison of one-year and two-year attrition for different aptitude category groups within each of the educational attainment groups (also presented separately for ARNG); and
- (i) Multivariate results.

All the analyses, with the exception of the multivariate model, are based on the Kaplan-Meier life-table estimators. The multivariate results are from the Cox regression model.

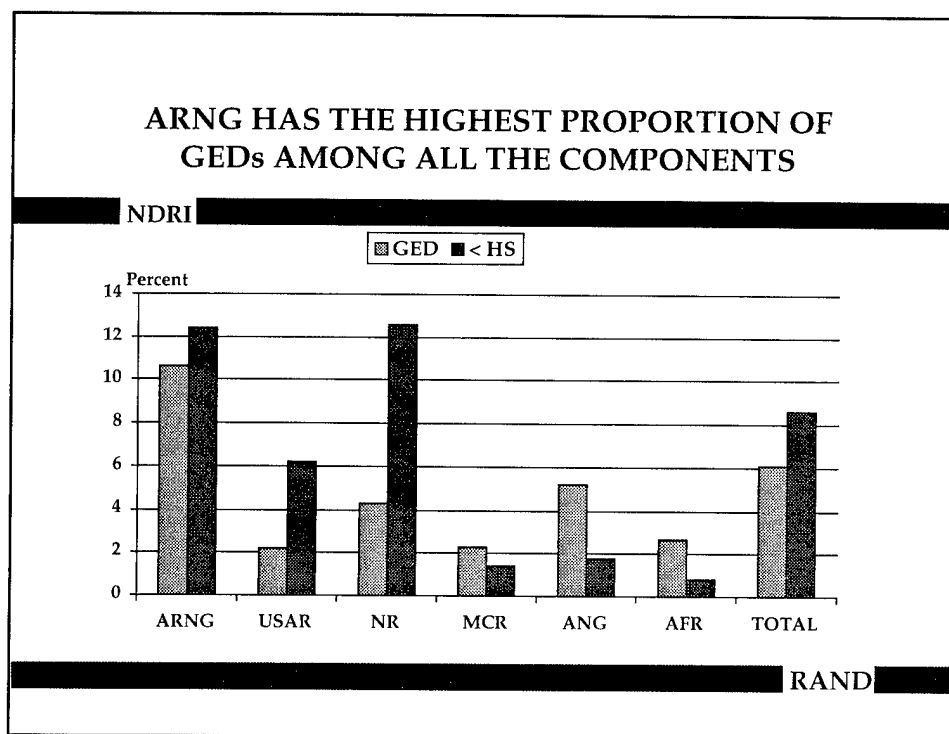


The remainder of the briefing is divided into two sections: The first presents findings for the nonprior-service group; the second focuses on the prior-service sample. Much of the analysis uses data from the combined FY86-FY94 entry cohorts, although when we examine trends in recent years, we present data that are disaggregated by fiscal year.

**PROFILES OF NPS RECRUITS
CATEGORIZED BY EDUCATIONAL ATTAINMENT**

NDRI				
Variable	<HS	GED	HSDG	College Graduate
Percent female	5.1	9.0	18.6	24.8
Percent black	13.1	14.2	20.4	19.7
Percent Hispanic	4.9	6.4	4.9	3.4
Percent CAT I-II	24.9	22.8	43.4	75.7
Average age	19.3	20.8	19.4	26.4
RAND				

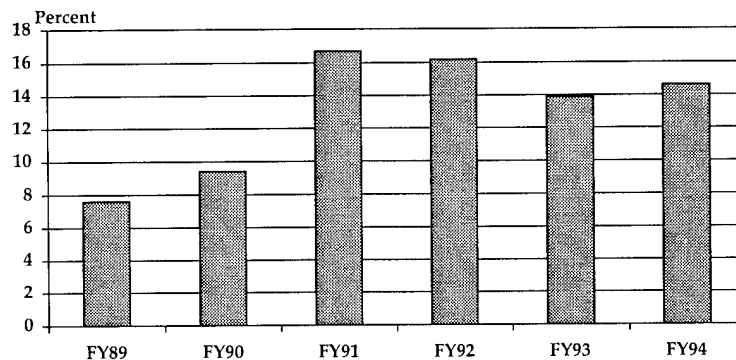
To set the context for the analysis, it is useful to examine the demographic characteristics of the various groups in which we are interested. Here we find that NPS recruits categorized by educational attainment look quite different in terms of gender, race/ethnicity, aptitude, and age. GEDs tend to be somewhat older than high school diploma graduates, with a much smaller proportion of women and blacks, and a higher proportion of Hispanics. College graduates tend to have the highest proportion of women of all four groups, a much lower proportion of Hispanics, and as one would expect, are considerably older. The table points out the clear relationship between aptitude and educational attainment.



The proportion of GEDs in the combined FY86-FY94 accession NPS cohorts is quite low: about 6 percent. The ARNG has the highest proportion of GEDs among all the components: 11 percent. We also show the proportion of those with less than a high school education to set the context for the analysis—the two groups together represent the proportion of nonhigh school diploma graduates (NHSDGs) in the Reserve components. Overall, NHSDGs account for a little under 15 percent of all reserve NPS accessions but there is substantial difference among the components in their acceptance of NHSDGs: The ARNG has the highest proportion, over 22 percent, compared with 8 percent in the USAR and even lower proportions in the MCR and the two Air Reserve components. The NR appears to have taken in a large proportion of those with a less than HS diploma during this time period as well.

RECENT COHORTS OF ARNG NPS ACCESSIONS HAVE A MUCH HIGHER PROPORTION OF GEDs

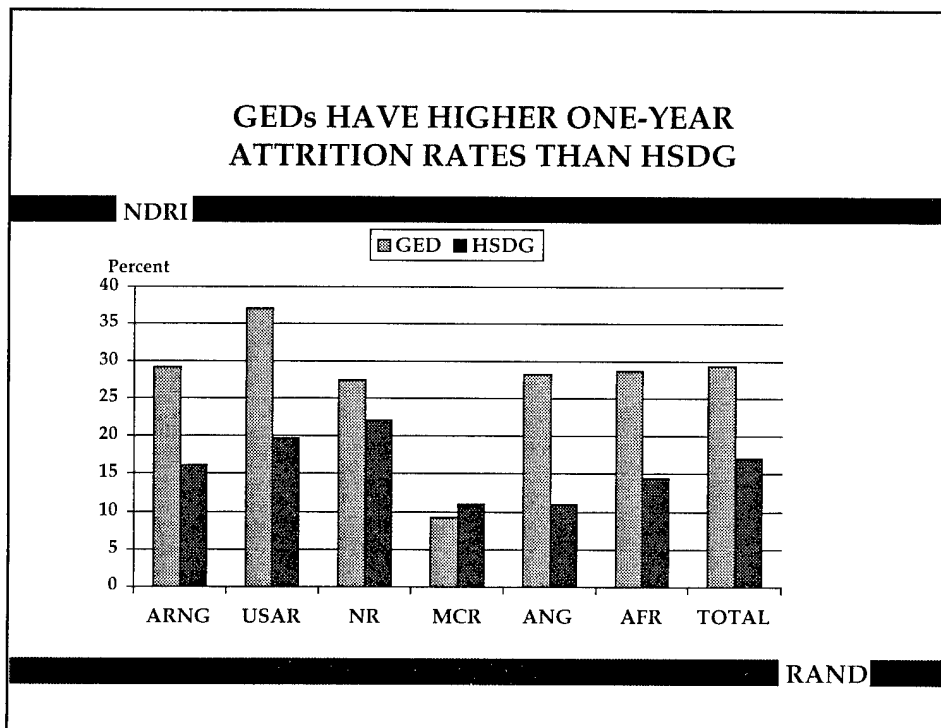
NDRI



RAND

We examined trends over time to see whether the proportion of GEDs has changed in more recent cohorts. Because the ARNG takes in the largest numbers of GEDs, we limit this chart to trends in the ARNG only and to increase readability, we show data only for the six most recent cohorts. We find that the proportion of GEDs in more recent NPS cohorts has increased substantially, from under 8 percent in the FY89 cohort to over 14 percent in the FY94 cohort. (This is not true of other components where the proportion of GEDs remained stable or declined slightly.) The FY91 increase is partly explained by the fact that the goal for enlisted gains for ARNG was set at 93,352, which was considerably higher than the previous year goal; in an attempt to achieve this goal (they only achieved 73 percent of the goal), the ARNG took in higher numbers of both NPS and PS GEDs. Of late, the number of GEDs has fallen (for example, among the NPS accessions, GEDs numbered 5,346 in FY91 but were down to about 3,000 by FY95), but because the total number of NPS accessions has decreased as well, the proportion of GEDs remains at about 12-13 percent.

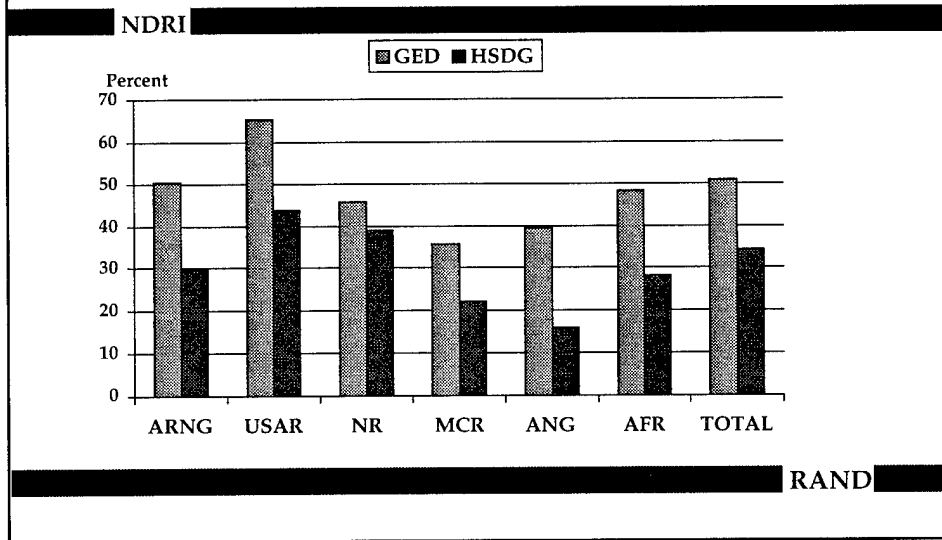
The proportion of NPS accessions who did not have a high school education also varied substantially over this time period. In FY89, about 11 percent of NPS accessions had less than a high school education; in FY91, this had risen to 18 percent; in that year, over a third of all accessions were NHSDGs. In the most recent cohorts, there appears to have been a tradeoff in terms of accessions between those with less than high school and GEDs; the ARNG has increased its GED accessions but the proportion of those with less than a high school education has fallen dramatically (to less than 1 percent by FY94.)



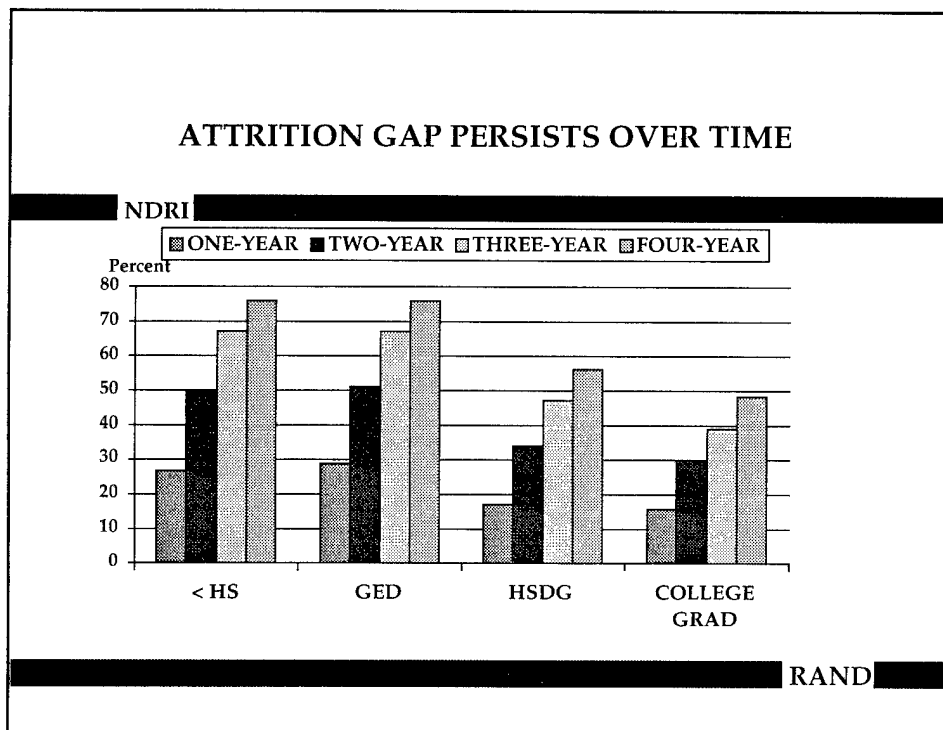
This chart presents one-year attrition rates for the FY86-FY93 combined cohorts, all of whom we have observed for at least one full year. Overall, we find that about 16 percent of HSDG recruits leave within one year of joining the reserve. This represents unprogrammed attrition in the sense that all of these separations are before the end of the enlisted term of service, which is generally six years for a NPS recruit. GEDs have a markedly higher one-year attrition rate of 30 percent or almost double the attrition rate of HSDG recruits.⁶ The difference between the attrition rates of GEDs and HSDGs is consistent across the components with the exception of the NR where the difference is considerably smaller (5 percentage points compared to 13-18 percentage points in the Army and Air Force Reserve components) and the MCR, where there is virtually no difference. The Marine Corps Reserve takes in very few GED recruits overall and apparently does a good job of selecting individuals who do stay in the reserve.

⁶ All reported differences in attrition rates shown here and in subsequent charts are statistically significant at the 1 percent level.

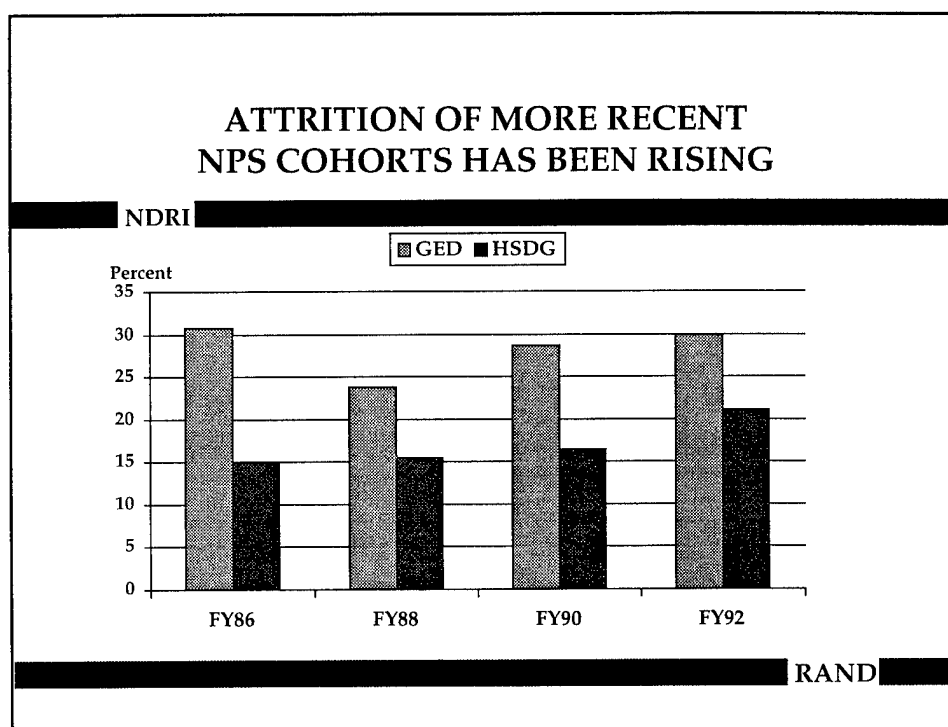
SIMILARLY, GEDs HAVE HIGHER TWO-YEAR ATTRITION RATES THAN HSDGs



To see whether the pattern changes, once recruits are past the first year, we examined two-year attrition rates. Overall, there is a 17 percentage point difference in the two-year attrition rate between these two groups: About 34 percent of HSDGs leave the reserve within two years compared with over one-half of all GEDs. Among the various components, the differences range from a low of 7 percentage points (NR) to a high of 23 percentage points (ANG). The MCR also shows a large difference: The attrition rate for GEDs is 36 percent compared to 22 percent for HSDGs.



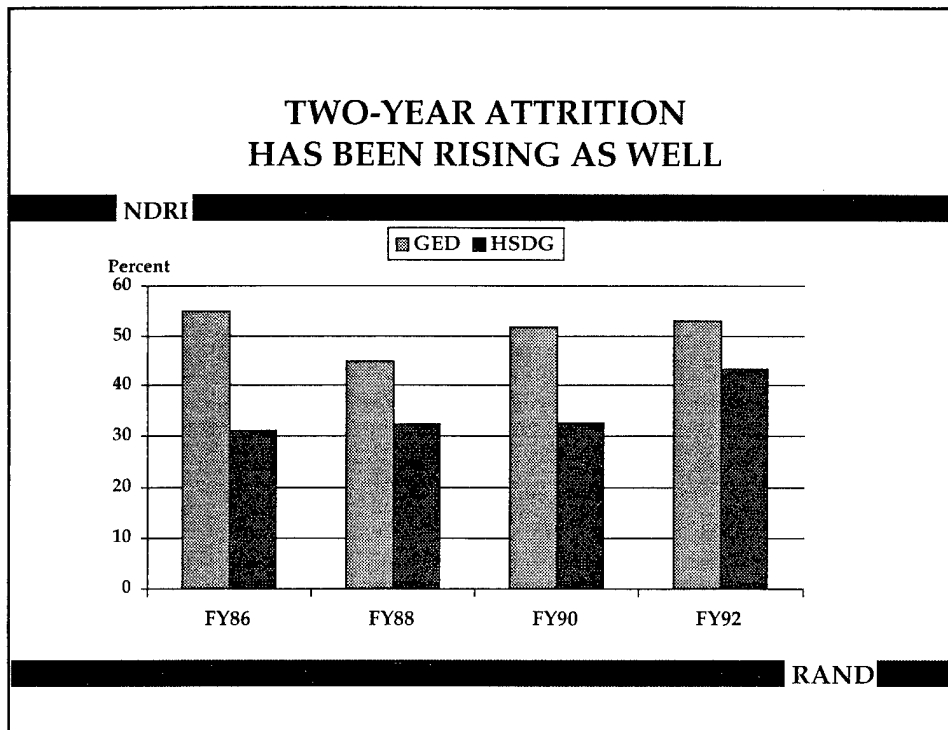
This graph shows the longer-term attrition pattern. We track individuals for four years and examine the differences in attrition at each year point among reservists categorized by educational attainment. We present data for four groups: <HS, GEDs, HSDGs, and college graduates because of the frequent questions regarding similarities between <HS and GEDs on the one hand, and HSDGs and college graduates, on the other. Those with less than high school and GEDs look remarkably similar: By the end of the second year, about 50 percent of these individuals have left; by the fourth year, over three-quarters of them have separated. Although one expects a lot of turbulence and turnover among this age group (see Grissmer and Kirby, 1988), nonetheless this represents a substantial loss of recruiting and training dollars. In contrast, a much higher proportion of those with a high school education and above remain in the reserve for a longer period of time. For example, 45 percent of the HSDG group make it to the end of four years. College graduates have much lower attrition rates than HSDGs—over half of them are still in the reserve four years later.



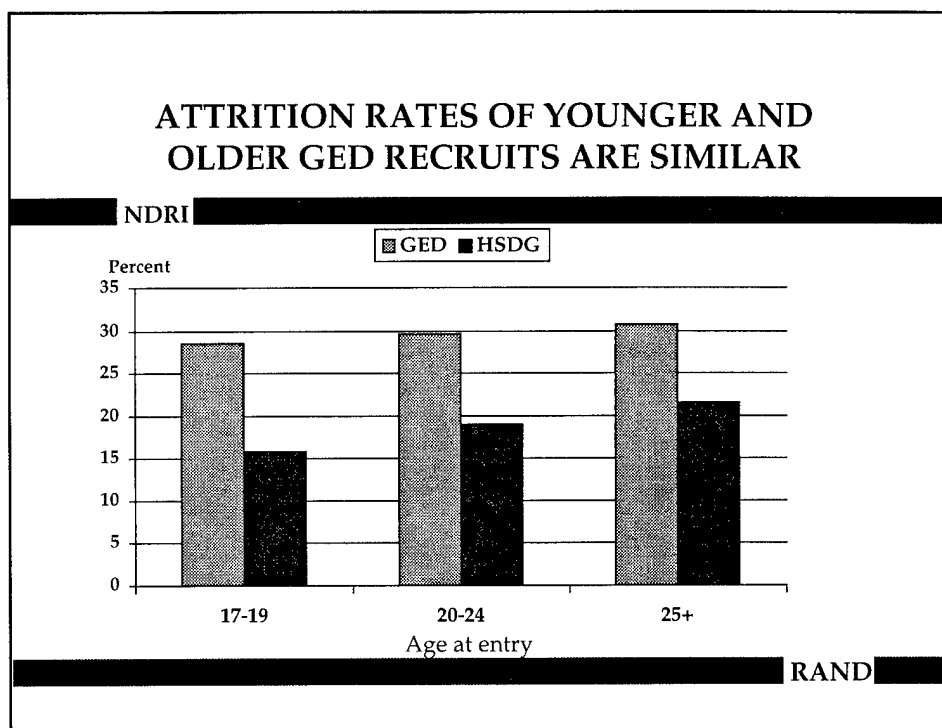
In an effort to track trends over time, we examined the one-year attrition experience of selected cohorts. Each of these cohorts, regardless of quarter of entry, has been tracked for a full two years. This allows us to compare one- and two-year attrition rates for the same cohorts.

We find that the one-year attrition rate of GEDs was around 30 percent for the FY86 entry cohort and declined for the FY88 cohort. However, recent cohorts appear to have experienced rising attrition and the attrition rate of the FY92 cohort is about equal to that of the FY86 cohort. This increase is reflected in the experience of HSDGs as well and may reflect partly the effect of the drawdown and/or "creaming" of the cohorts.

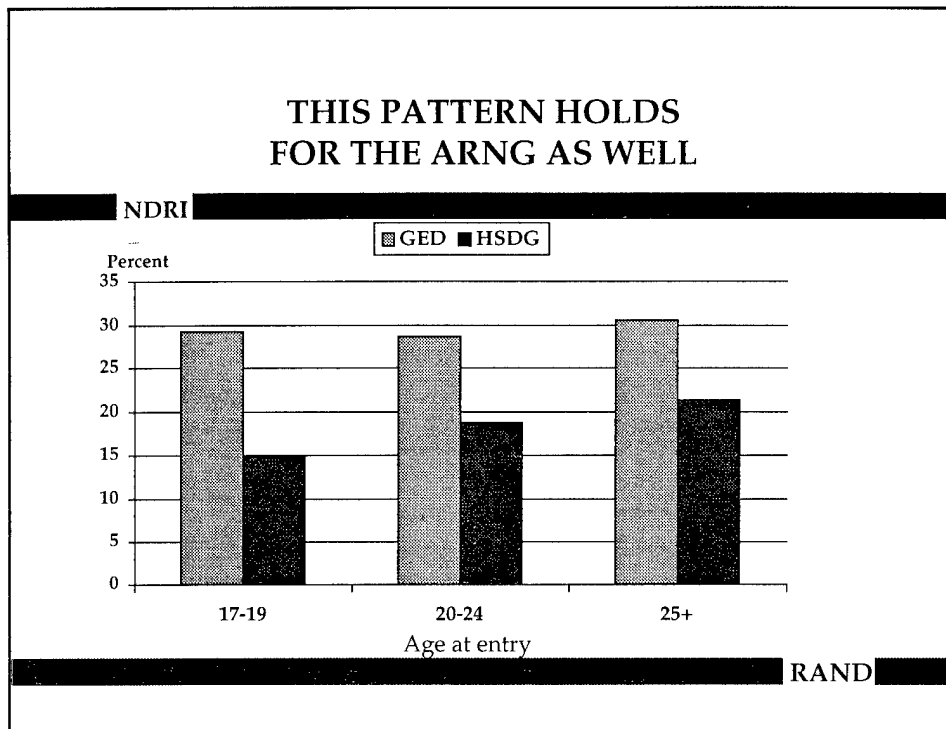
The attrition gap between HSDGs and GEDs ranges from 8-15 percentage points. Although it was smaller for the FY92 cohort than for the FY90 cohort, by FY93, the gap (not shown here) had widened from 9 to 13 percentage points. Despite the variance in magnitude, it is clear that the attrition gap is large and significant.



The same pattern is evident in the two-year attrition statistics. Attrition declined for the FY88 cohort but rose again for the more recent cohorts. Over half of all GEDs tend to leave within two years compared with about a third of the HSDGs. The gap in the attrition rate of GEDs and HSDGs is considerably smaller for the FY92 cohort: 10 percentage points compared to 20 percentage points for the FY90 cohort. It is surprising that attrition of HSDGs has increased relative to that of GEDs. It would be interesting to track more recent data to see whether this pattern has continued and if so, to investigate the reasons why.

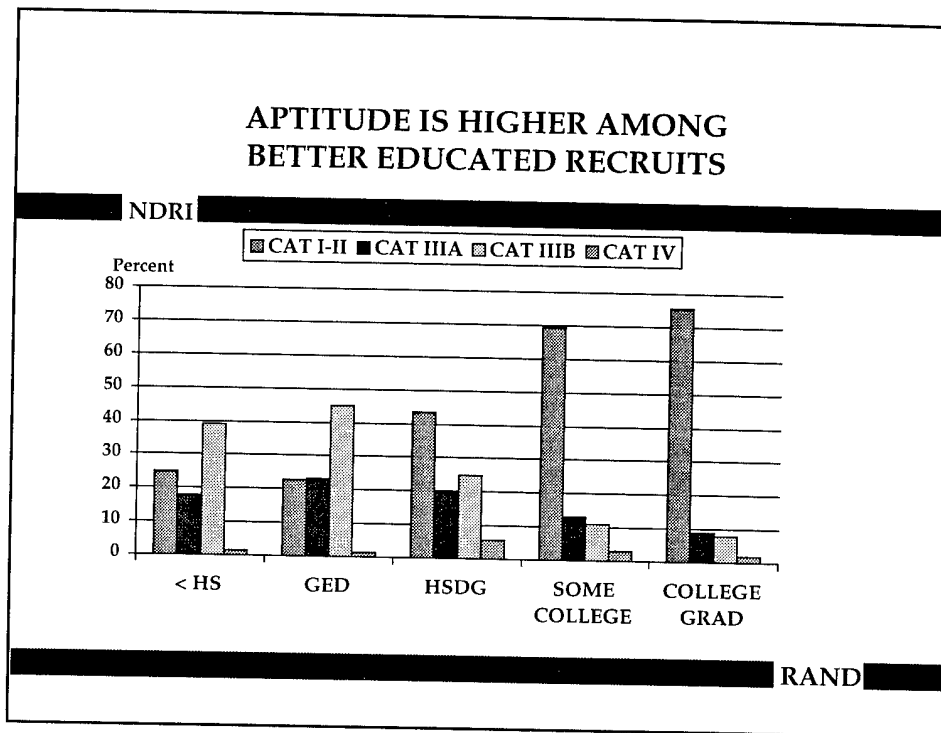


One question we were asked to analyze was whether age appeared to influence the attrition behavior of GED enlistees. We grouped GEDs into three categories: 17-19 years, 20-24 years, 25 years and older, based on their age at entry into the reserves. As the chart shows, there is little difference between younger and older GEDs: all three groups have one-year attrition rates of close to 30 percent. Among HSDGs, we find that age does appear to make a difference: Older recruits have attrition rates that are 6 percentage points higher than younger recruits. This has been found in previous studies as well (Grissmer and Kirby, 1988; Kirby and Grissmer, 1993).



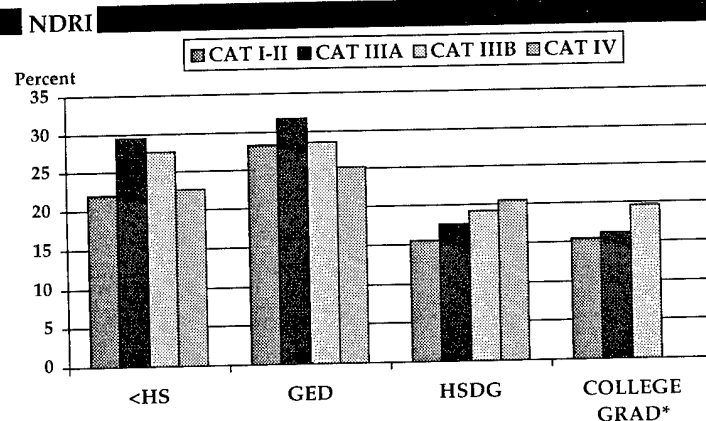
To test more specifically whether the pattern of little difference with respect to age held for the ARNG, we examined differences in one-year attrition for the three age groups of ARNG enlistees. The findings mimic those depicted in the previous slide:

- (a) little or no difference among GEDs (this is not surprising given that the ARNG accounts for 70 percent of all nonprior-service GED accessions); and
- (b) higher attrition among the HSDGs among the older age groups.



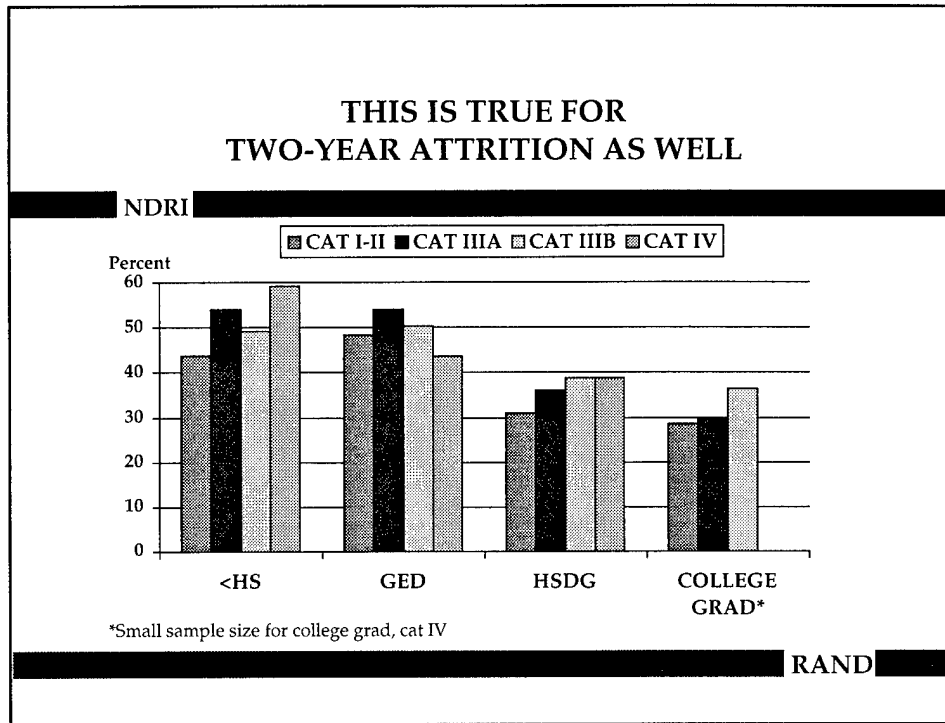
The link between aptitude and educational attainment is clearly demonstrated by the above chart, which shows the aptitude rankings for enlistees grouped by educational attainment. However, that the two variables are not precisely collinear is equally clear. For example, individuals without a high school diploma are distributed across the aptitude spectrum with between 40-45 percent scoring in the upper half of the Armed Forces Qualifying Test. (The numbers do not add to 100 percent because of a small proportion of enlistees who are classified as Category III (unknown)). However, on average, we find that better educated recruits clearly do better on the AFQT. Between 70-75 percent of those with some college score in the upper two-thirds of the distribution.

REGARDLESS OF AFQT CATEGORY, GEDs HAVE MUCH HIGHER ATTRITION THAN HSDG



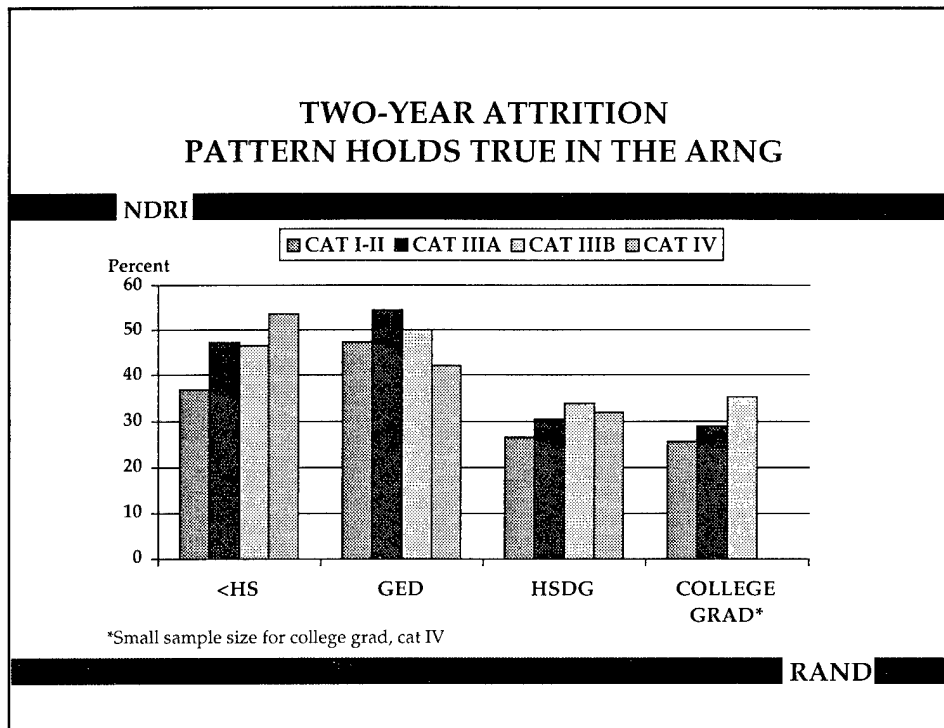
RAND

An important question that frequently arises is whether GEDs who score high on the aptitude test do "better" than HSDGs who score lower. In other words, can a higher percentile ranking on the AFQT compensate in some way for the lack of formal schooling? Judging by the graph, the answer clearly is "no." There is some difference in the attrition rates of GEDs grouped by aptitude category but the difference runs counter to what one would have hypothesized: Those who score higher have marginally *higher* attrition rates. All GEDs, however, regardless of aptitude, have significantly higher attrition rates compared to HSDG enlistees and higher attrition than those with less than a high school education. Among the HSDG recruits, we find that lower aptitude is associated with higher attrition (a difference of 6 percentage points between CAT I-II and CAT IV), a finding that reinforces earlier research (Grissmer and Kirby, 1988; Kirby and Grissmer, 1993). College graduates show much the same pattern.



Two-year attrition rates show exactly the same pattern. The attrition rate of CAT IV GEDs is 44 percent, 10 percentage points lower than the attrition rate of CAT IIIA GEDs. (Notice that the attrition rates of the <HS group is higher than that of GEDs, with the exception of CAT I-II.)

Among HSDGs and college graduates, we find the expected relationship between aptitude and attrition, although the CAT IIIB group does not seem to fare any better than the CAT IV group. In any case, the bottom line is pretty clear: Aptitude does not fully compensate for lack of formal schooling in terms of attrition behavior.



Again, to be certain that the pattern we had seen earlier with respect to the relationship between aptitude and attrition held true in the ARNG as well, we present the same graph for NPS recruits in the ARNG. There is no difference between this and what we had seen earlier for the Reserve components as a whole. (It is interesting to note that there is a 10 percentage point difference between <HS and GED CAT I-II in the ARNG compared with a 4 percentage point difference in the combined total sample).

MULTIVARIATE RESULTS CONFIRM LARGE GAP BETWEEN ATTRITION OF GED AND HSDG GROUPS

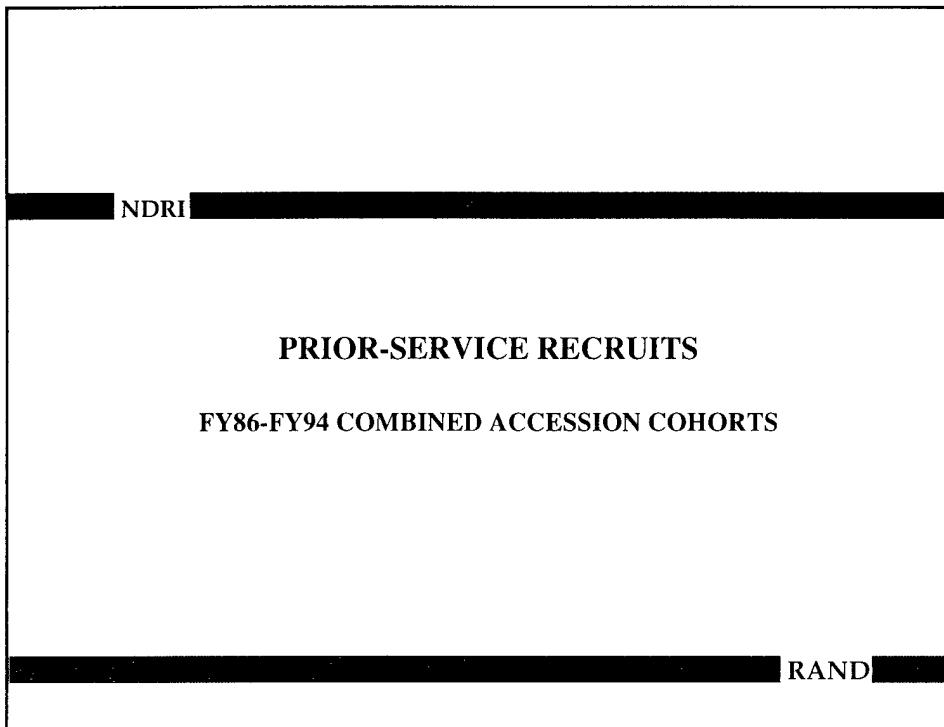
NDRI

- More comprehensive attrition model isolates net effect of various factors
 - Recruit characteristics: gender, race/ethnicity, aptitude, education, age at entry, marital status, number of dependents
 - Military characteristics: component, entry cohort, paygrade, occupation
 - local economy: local unemployment and wage rates
- Attrition for GED group is estimated as 1.7 times that of HSDG group after controlling for other factors

RAND

We are completing work on a comprehensive analysis of factors affecting attrition in the Selected Reserve. This analysis controls for a variety of recruit characteristics, military characteristics, and local economic conditions that might affect attrition.

This multivariate approach confirms what we had seen earlier. There is a large gap between the attrition rates of the GED and HSDG groups. If we compare individuals who are otherwise identical, the analysis shows that the attrition rates for the GED group are 1.7 times those of the HSDG group (95 percent confidence interval for the coefficient is (1.66-1.75); $p\text{-value} < .000$). In a separate ARNG analysis, we find that the gap is also 1.7 to 1.



We turn now to the evidence with respect to prior-service recruits to test the two hypotheses mentioned earlier:

- (a) Are factors affecting attrition different for PS versus NPS enlistees?
- (b) Is lack of formal schooling somehow less of a handicap for PS recruits than it appears to be for NPS recruits?

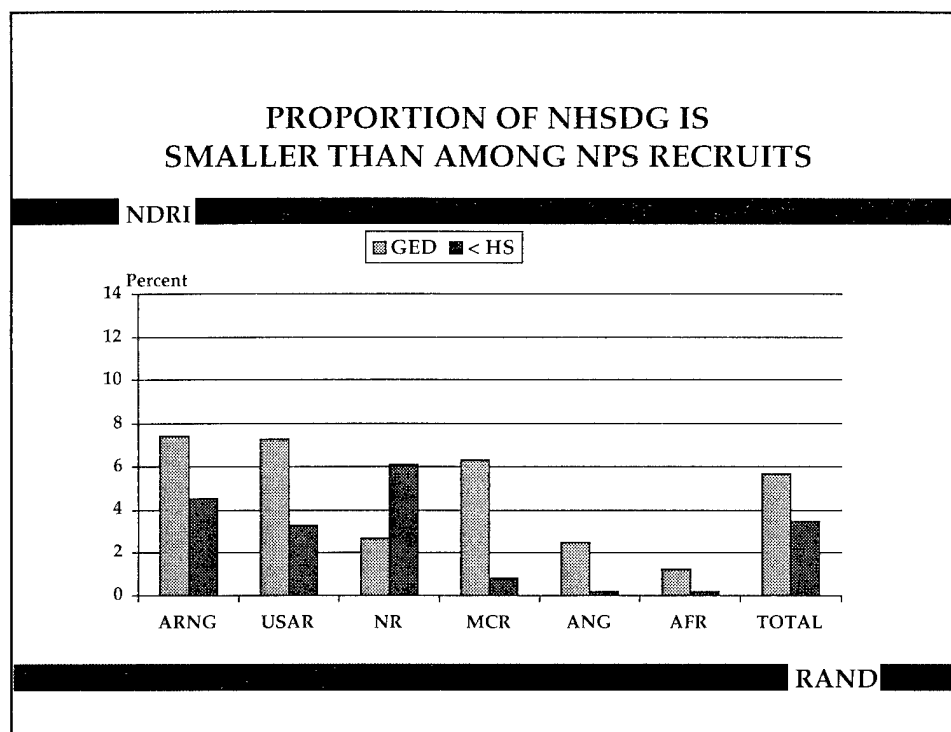
**PROFILES OF PS RECRUITS
CATEGORIZED BY EDUCATIONAL ATTAINMENT**

NDRI

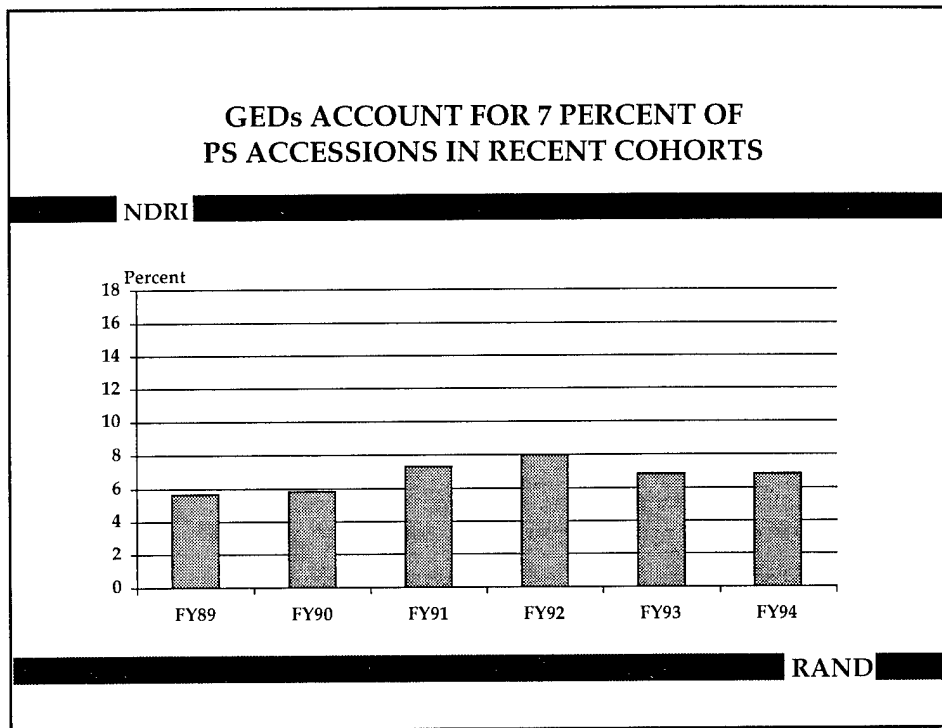
Variable	<HS	GED	HSDG	College Graduate
Percent female	5.3	5.5	12.1	16.6
Percent black	18.5	16.4	20.8	15.7
Percent Hispanic	4.4	4.2	3.9	3.6
Percent CAT I-II	31.5	34.9	39.4	76.7
Average age	25.3	27.4	28.7	32.7

RAND

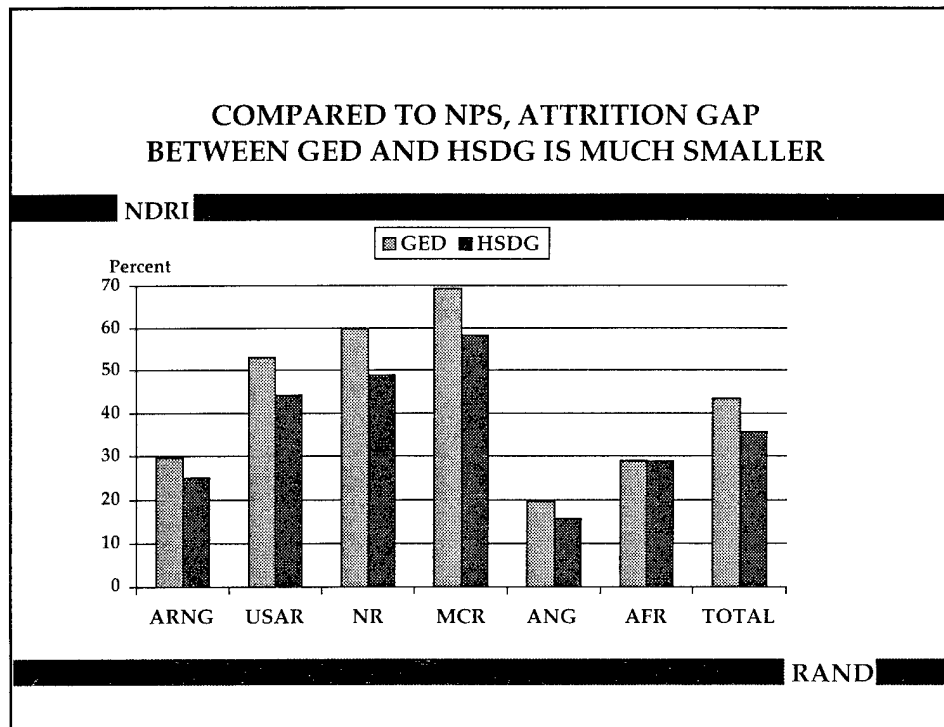
This slide shows a profile of PS recruits categorized by educational attainment. Although there are clear differences among the groups, the differences are much less marked than is the case with NPS recruit groups. Overall, there is a much smaller proportion of women among PS accessions; the proportions in the NHSDG groups are quite small ~ 5 percent. The GED and college graduate groups have fewer blacks. The GEDs also tend to be older than either those with less than high school or HSDG. The proportion scoring in CAT I-II is considerably higher among the prior-service <HS and GED groups than was the case with the nonprior-service groups.



To set the context for the discussion, we present statistics on what proportion of PS accessions is accounted for by non-HSDGs. The scale is the same as for the NPS graph to facilitate comparison between the two. Altogether, 8.2 percent of PS recruits do not have a high school diploma compared with 14.6 percent of NPS recruits, but the proportion of GEDs is remarkably close: 5.7 percent as opposed to 6.1 percent in the NPS cohort. ARNG and USAR have the highest proportion of GEDs—around 7 percent—and the MCR is a close third with a little over 6 percent.



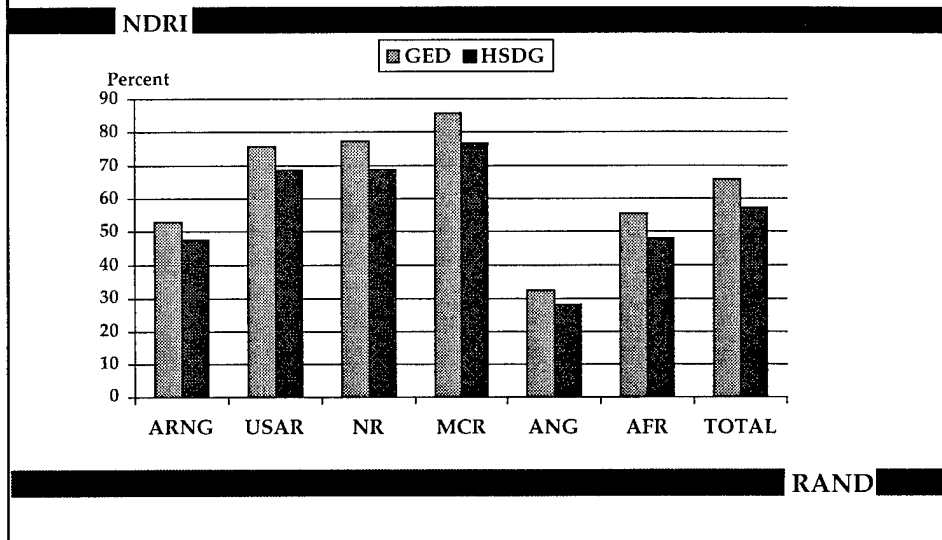
Because our major focus has been on the ARNG, we examine here trends in the take-rate of GEDs in the Guard. Recent cohorts do have a somewhat higher proportion of GEDs but the trend is nowhere as dramatic as with the NPS accessions. It appears that the Guard took in larger numbers of GEDs in FY91 and FY92 among both PS and NPS accessions but this has tapered off a little in later years. GEDs account for 7 percent of all PS accessions in recent years.



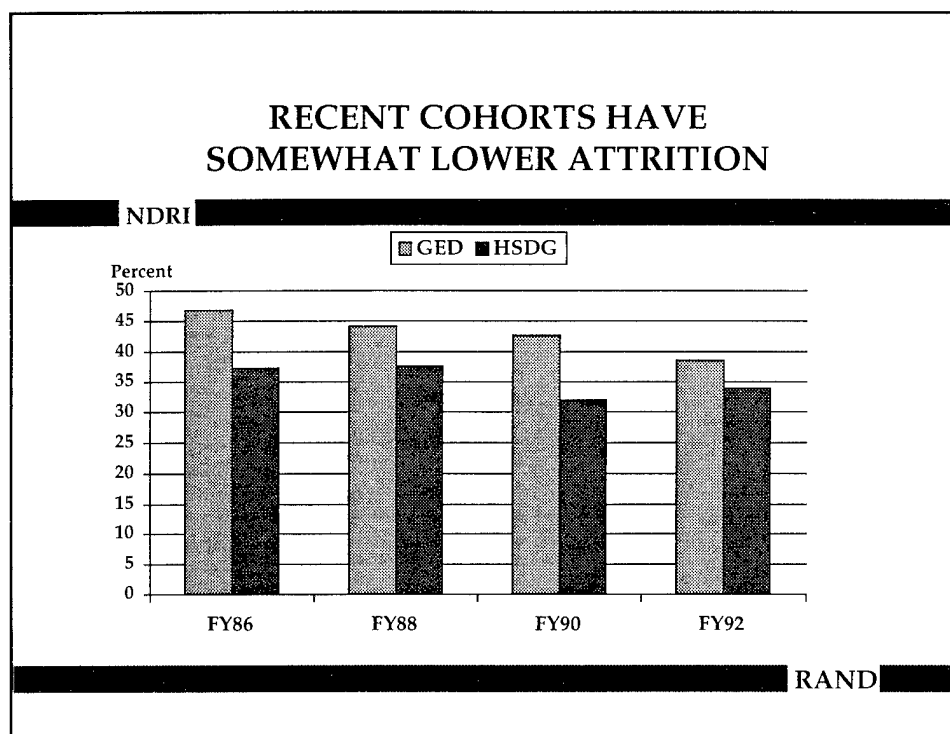
Many PS recruits sign up for a year at a time; thus, the one-year attrition rates are not directly comparable with those of the NPS enlistees. For PS recruits, attrition usually reflects separation at the end of the term for which they have signed up; for NPS recruits, early separation reflects unprogrammed attrition, which increases recruiting and training costs. Given that, we find that about 35 percent of all PS accessions leave within one year of joining compared with 19 percent of NPS accessions. The difference between GED and HSDG attrition is not as marked as what we saw earlier with NPS accessions: 7 percentage points overall compared to 14 percentage points. In percentage terms, the difference is even smaller; among NPS accessions, GED attrition rates are over 80 percent higher than those of the HSDG group; among PS accessions, the rate is about 20 percent higher.

In some components it is higher (9-11 percentage points) but in the ARNG and the two Air components, the difference in attrition is quite small (1-5 percentage points). Overall, we infer that lack of the formal diploma does not appear to have as great an effect on attrition among PS recruits as among NPS recruits.

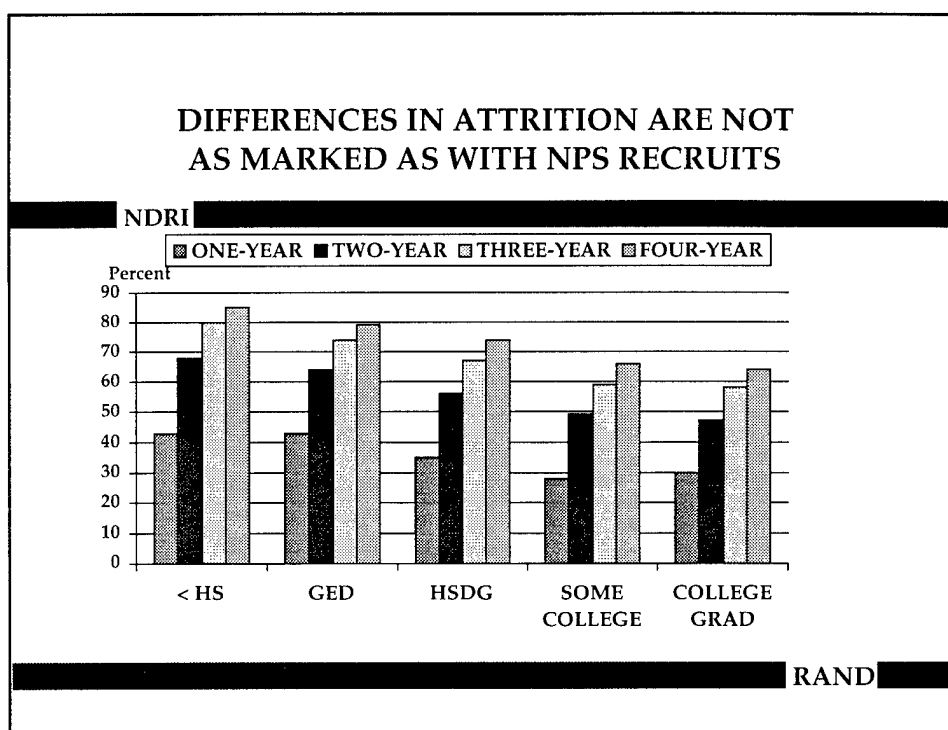
TWO-YEAR ATTRITION SHOWS THE SAME SMALL DIFFERENCE BETWEEN GEDs AND HSDGs



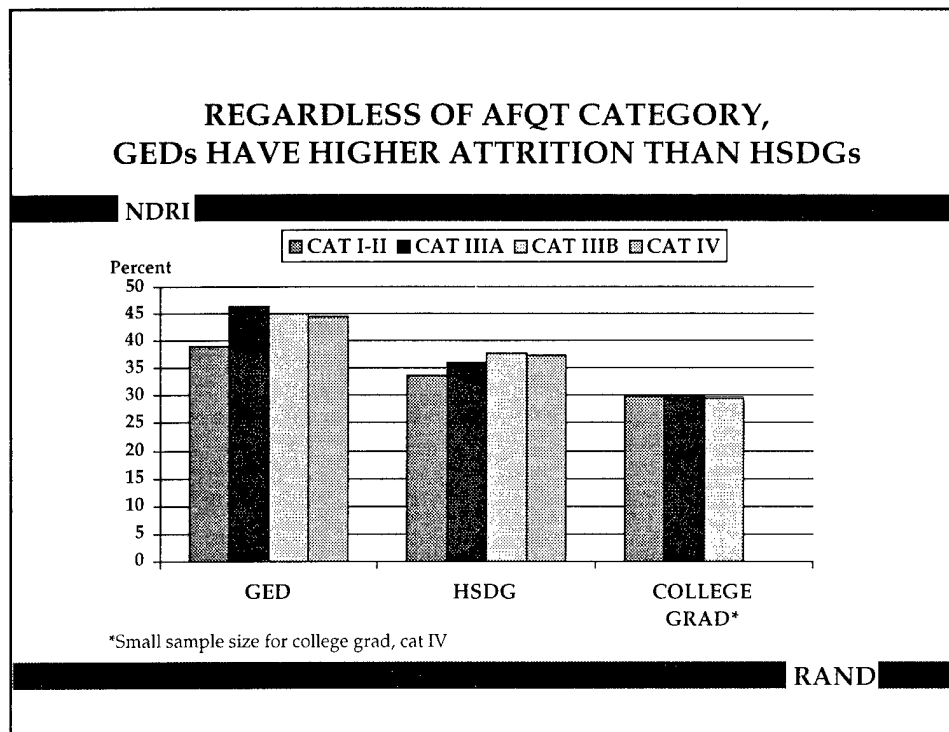
Again, to make sure that the one-year attrition rates were not an anomaly, we examined two-year attrition for the six components. We find a somewhat larger gap between the GEDs and the HSDGs of about 8 percentage points (although this is considerably smaller than the 17 percentage point difference we had seen in the two-year attrition statistics for the NPS group). Again, the pattern with respect to the components is quite mixed, with some components having slightly larger and some slightly smaller differences.



When we examine trends over time, we find that unlike the NPS entry cohorts, more recent cohorts of PS accessions have experienced *lower* attrition. Attrition for the GEDs has fallen from 47 percent for the FY86 cohort to 39 percent for the FY92 cohort and (not shown here) 35 percent for the FY93 cohort. The decline in attrition among HSDGs is not quite as marked: from 37 percent to 34 percent and remained at 34 percent for the FY93 cohort. The gap between HSDGs and GEDs has narrowed for the FY92 cohort to 5 percentage points and is even smaller for the FY93 cohort.



To see whether the attrition gap is sensitive to time, we present attrition statistics over a four-year period for the different groups categorized by educational attainment. Those with less than high school have the highest attrition rates and those with college degrees clearly stay the longest. However, when we compare the attrition rates of GEDs and HSDGs we find that the 8 percentage point gap in the first-year rates narrows a little by the fourth year to 5 percentage points. We do not find the same magnitude with respect to differences in attrition of the two groups as was the case with NPS enlistees.



The pattern we had seen earlier with respect to the relationship (or lack thereof) between aptitude ranking and attrition is evident here as well. Although CAT I-II GEDs do have a somewhat lower attrition rate, CAT III-As have *higher* attrition than the lower-ranking groups. None of the aptitude groups, however, do better than the HSDG groups, regardless of AFQT category. College graduates, regardless of category, have an attrition rate of around 30 percent. It seems fair to conclude that aptitude does not appear to be as important in determining attrition behavior as educational attainment.

**MULTIVARIATE RESULTS SHOW THAT GEDs
HAVE HIGHER ATTRITION THAN HSDGs**

NDRI

- Same analysis model as before
 - Individual characteristics
 - Military characteristics including length of time on active duty
 - Local economic conditions
- GED attrition is about 1.2 times HSDG attrition
- As expected, attrition gap is smaller for PS than NPS

RAND

The same set of variables are used in the analysis of PS attrition as in our analysis of NPS attrition. We also added variables to indicate the length of time served on active duty before joining the reserves (Buddin and Roan, 1994, find lower attrition for PS personnel with short active-duty tours).

The results indicate that the gap between GED and HSDG attrition is much smaller than for NPS recruits. Nonetheless, among PS reservists, attrition in the GED group is about 1.2 times that of the HSDG group (95 percent confidence interval for the estimated coefficient is (1.13-1.20); $p\text{-value} < .000$).

CONCLUSIONS I

NDRI

- **How common are GED accessions?**
 - 6 percent of both NPS and PS accessions are GEDs
 - ARNG has the highest proportion: 11 percent of NPS and 7 percent of PS recruits
- **How does GED attrition compare with that of high school diploma graduates?**
 - Among NPS recruits, GEDs have markedly higher attrition than HSDG
 - Among PS recruits, the differences are not as large
 - This holds true across all components, and over time

RAND

We had started this analysis with several questions:

(a) How common are GED accessions?

- Approximately 6 percent of all accessions are GEDs;
- This proportion is considerably higher in the ARNG; and,
- The Guard has been taking in higher proportions of GEDs in recent years.

(b) How does GED attrition compare with that of HSDGs?

- Among NPS recruits, the lack of a formal diploma appears to have a marked negative effect on attrition, with GEDs having attrition rates that are close to double that of HSDGs (30 percent compared with 16 percent);
- Among PS recruits, the differences are considerably smaller (8 percentage points);
- In percentage terms, the differences are even more marked: compared with the attrition rate of the HSDG group, the first-year attrition rate of the GED group is 80 percent higher among NPS accessions and only 20 percent higher among PS accessions;
- These patterns hold true over time and across components.

CONCLUSIONS II

NDRI

- Are some GEDs "better" than others?
 - Trends in recent years
 - Recent NPS cohorts have somewhat higher attrition
 - Marked attrition gap between GEDs and HSDGs
 - PS cohorts have slightly declining attrition
 - Attrition gap has narrowed slightly over time
 - Older versus younger recruits
 - Attrition rates of older and younger GEDs are similar
 - Higher aptitude versus lower aptitude
 - Regardless of AFQT category, GEDs have:
 - Much higher attrition than HSDG among NPS recruits
 - Somewhat higher attrition among PS recruits

RAND

(c) Are some GEDs "better" than others?

• Attrition rates for recent NPS cohorts have risen (particularly among the HSDG recruits) while those for PS entry cohorts have declined (although not as much for the HSDG recruits). The attrition gap between GEDs and HSDGs has narrowed a little but for NPS recruits, the difference is still quite marked.

• Attrition rates are quite similar for younger and older GEDs although among HSDGs, age does have an effect on attrition, with older recruits leaving at higher rates than younger recruits.

• Aptitude category does not appear to compensate for the lack of formal schooling. Higher-aptitude GEDs do not have markedly lower attrition than lower-aptitude GEDs and regardless of AFQT category, they have significantly higher attrition than HSDGs (somewhat higher among PS recruits).

All in all, GEDs appear to be "high-risk" accessions, and this holds true regardless of age or aptitude. Recruiting them does not appear to be cost-effective. Even if they are considerably cheaper to recruit than HSDGs, the high rates at which they leave means a considerable loss of training investment and potential loss of readiness due to turbulence and this makes them an expensive source of accessions.

REFERENCES

Buddin, Richard, *Analysis of Early Military Attrition Behavior*, Santa Monica, CA: RAND R-3069-MIL, 1984.

Buddin, Richard, and Sheila Nataraj Kirby, *Enlisted Personnel Trends in the Selected Reserve, 1986-1994*, Santa Monica, CA: RAND, MR-681/2, 1996.

Buddin, Richard, and Carole E. Roan, *Assessment of Combined Active/Reserve Recruiting Programs*, Santa Monica, CA: RAND, MR-504-A, 1994.

Cameron, Stephen V., and James J. Heckman, "The Nonequivalence of High School Equivalents," *Journal of Labor Economics*, Vol. 11, No. 1, Pt. 1, 1993, pp. 1-47.

Cox, D. R., "Regression Models and Life-Tables," *Journal of the Royal Statistical Society, Series B* 34, 1972, pp. 187-220.

Grissmer, David W., and Sheila Nataraj Kirby, *Attrition During Training in the Army Reserve and Army National Guard*, Santa Monica, CA: RAND, R-3626-RA, 1988.

Grissmer, David W., Sheila Nataraj Kirby, Richard Buddin, Jennifer Kawata, Jerry Sollinger, and Stephanie Williamson, *Prior Service Personnel: A Potential Constraint on Increasing Reliance on the Reserve Forces*, Santa Monica, CA: RAND, MR-362-OSD, 1994.

Grissmer, David W., Sheila Nataraj Kirby, Mark Berends, and Stephanie Williamson, *Student Achievement and the Changing American Family*, Santa Monica, CA: RAND, MR-488-LE, 1994.

Grissmer, David W., and Sheila Nataraj Kirby, "A Total Force Perspective on Recruiting and Manning in the Years Ahead," in Mark J. Eitelberg and Stephen L. Mehay (ed.), *Marching Toward the 21st Century*, CT: Greenwood Press, 1994.

Kirby, Sheila Nataraj, and David Grissmer, *Reassessing Enlisted Reserve Attrition: A Total Force Perspective*, Santa Monica, CA: RAND, N-3521-RA, 1993.

Kirby, Sheila N. and David W. Grissmer, *Reassessing Enlisted Reserve Attrition: A Total Force Perspective*, Santa Monica, CA: RAND, N-3521-RA, 1993.

Murnane, Richard J., John B. Willett, and Kathryn Parket Boudett, "Do High School Dropouts Benefit from Obtaining a GED?" *Educational Evaluation and Policy Analysis*, Vol. 17, No. 2, Summer 1995, pp. 133-147.

Passmore, D.L., "Employment of Young GED Recipients," *American Council on Education Research Brief*, Vol. 14, 1988.

U.S. House of Representatives, *Report of the Committee on Armed Services, National Defense Authorization Act for Fiscal Year 1993*, H.R. 102-966, 1992.